

**REQUEST FOR PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PROGRAM BETWEEN THE JPO AND THE USPTO**

Application No :	10/570,343	First Named Inventor:	Yasuaki OGIWARA
Filing Date:	March 3, 2006	Attorney Docket No :	1009682-000157
Title of the invention:	Liquid for Electrophoretic Display, Display Medium and Display Device Using the Same		

THIS REQUEST FOR PARTICIPATION IN THE PPH PROGRAM ALONG WITH THE REQUIRED DOCUMENTS MUST BE SUBMITTED VIA EFS-WEB. INFORMATION REGARDING EFS-WEB IS AVAILABLE AT [HTTP://WWW.USPTO.GOV/EBS/EF5\\_HELP.HTML](http://www.uspto.gov/ebs/efs_help.html).

**APPLICANT HEREBY REQUESTS PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PROGRAM AND PETITIONS TO MAKE THE ABOVE-IDENTIFIED APPLICATION SPECIAL UNDER THE PPH PROGRAM.**

The above-identified application (1) validly claims priority under 35 U.S.C. 119(a) and 37 CFR 1.55 to one or more corresponding JPO application(s) or to a PCT application that does not contain any priority claim, or (2) is a national stage entry of a PCT application that does not contain any priority claim

The JPO/PCT application number(s) is/are: 2005-513637

The filing date of the JPO/PCT application(s) is/are: August 31, 2004

**I. List of Required Documents:**

- a A copy of the latest JPO office actions (other than "Decision to Grant a Patent") in the above-identified JPO application(s)**

- ☐ Is attached
- ☒ Is available via Dossier Access System Applicant hereby requests that the USPTO obtain these documents via the Dossier Access System

\*It is not necessary to submit a copy of the "Decision to Grant a Patent" and an English translation thereof

- b A copy of all claims which were determined to be patentable by the JPO in the above-identified JPO application(s)**

- ☐ Is attached
- ☒ Is available via Dossier Access System Applicant hereby requests that the USPTO obtain these documents via the Dossier Access System

- c English translations of the documents in a. and b. above along with a statement that the English translations are accurate are attached (if the documents are not in the English language).**

- d. (1) An information disclosure statement listing the documents cited in the JPO office actions**

- ☒ Is attached
- ☒ Has already been filed in the above-identified U.S. application on June 26, 2006

**(2) Copies of all documents (except for U.S. patents or U.S. patent application publications)**

- ☒ Are attached.
- ☐ Have already been filed in the above-identified U.S. application on \_\_\_\_\_

[Page 1 of 2]

This collection of information is required by 35 U.S.C. 119, 37 CFR 1.55, and 37 CFR 1.102(d). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.

**REQUEST FOR PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PROGRAM BETWEEN THE JPO AND THE USPTO**

(continued)

Application No :	10/570,343	First Named Inventor:	Yasuaki OGIWARA
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**II. Claims Correspondence Table:**

Claims in US Application	Patentable Claims in JPO Application	Explanation regarding the correspondence
26	1	Claims 47 is incorporated in to claim 26
28	2	Claims in JP patent are multi-dependent while claims in US application are single-dependent
30	3	
32	4	
35	5	
38	6	
41	7	
44	8	
50	9	
53	10	
56	11	
58	12	
61	13	
64	14	
67	15	
70	16	
73	17	
76	18	
79	19	
82	20	

III. All the claims in the US application sufficiently correspond to the patentable/allowable claims in the JPO application.

**IV. Payment of Fees:**

The petition fee under 37 CFR 1.17(h) as required by 37 CFR 1.102(d) must be paid via EFS-Web (using credit card, authorization to charge a deposit account, or electronic funds transfer).

Signature <i>Robert G. Mukai</i>	Date <i>February 25, 2008</i>
Name (Print/Typed) Robert G. Mukai	Registration Number 28531

## DECLARATION

In the matter of  
U.S. Serial No. 10/570,343  
in the name of Yasuaki OGIWARA,  
Astushi SATO, Takahiro OSADA and  
Takao KOYAMA

I, the undersigned, Hidekatsu KAWASHIMA, of Fujimoto Patent and Law Office, of Room 317, Sanno Grand Building, 14-2, Nagata-cho 2-chome, Chiyoda-ku, Tokyo, Japan, do solemnly and sincerely declare as follows:

1. That I am well acquainted with the English and Japanese languages and am competent to translate Japanese into English and vice versa.

2. That I have executed, with the best of my ability, a true and correct translation to the attached copies of a translation of a Japanese Notification of Reasons for Refusal dated March 14, 2006, a translation of a Japanese Amendment filed May 15, 2006, a translation of Decision of Refusal dated December 11, 2006, a translation of another Japanese Amendment filed March 12, 2007, and Decision to Grant a Patent dated May 29, 2007 in connection with the corresponding Japanese Patent Application No. 2005-513637 that became patented as Japanese Patent No. 3966890 on June 8, 2007.

This 5th day of February 5, 2008

  
Hidekatsu KAWASHIMA

Reference number            Dispatch Number 105912

Dispatch Date March 14, 2006

**Notification of Reason(s) for Refusal**

Patent Application No.	Patent Application No. 2005-513637
Drafting Date	March 10, 2006
Examiner of JPO	Tadashi KAWAHARA    9017 2X00
Representative	Eisuke Fujimoto
Applied Provision	Patent Law Section 29(2), 36

This application should be refused for the reason mentioned below. If the applicant has any argument against the reason, such argument should be submitted within 60 days from the dispatch date of the notification.

**Reasons**

**Reason 1**

The inventions in the claims mentioned below of the subject application should not be granted a patent under Patent Law Section 29(2) since they could have easily been made by persons who have common knowledge in the technical field to which the inventions pertain, on the basis of inventions described in the publications mentioned below which were distributed in Japan or foreign countries or the inventions enabled to be utilized by general public through electrical communication circuits prior to the filing of the subject application.

Note

With regard to the inventions in claims 1 to 24 : Cited documents 1 to 12.

Remark:

Claim 1

As described in cited documents 1, 2 and 3, it is merely a well-known technical matter prior to the present application to use dispersants by suitably mixing two or more kinds of dispersants such as a surfactant and a block type polymer and to use as a surfactant polyoxyethylene alkyl amines such as polyoxyethylene stearyl amine, polyoxyethylene lauryl amine, polyoxyethylene alkyl amine and polyoxyethylene alkyl amine ether in a liquid for electrophoretic display considering dispersibility and electric charge of particles.

Further, as described in cited documents 2 to 5, it is merely a well-known art prior to the present application to subject fine particles to surface treatment for making lipophilic with a coupling agent of titanate base, aluminium base or silane base in a liquid for electrophoretic display considering dispersibility and electro charge of fine particles, and it could be easily made by persons skilled in the art to compose a liquid for electrophoretic display having a constitution described in claim 1 based on art described in cited documents 1 to 3.

Moreover, prior to the present application, well-known as a surfactant are polyethyleneglycol lauryl amine, polyethyleneglycol alkyl (coconut) amine, polyethyleneglycol stearyl amine, polyethyleneglycol alkyl (beef tallow) amine, polyethyleneglycol alkyl (deer tallow) amine,

polyethyleneglycol alkyl (sheep tallow) amine, polyethyleneglycol alkyl (beef tallow) propylene diamine, and polyethyleneglycol dioleamine (refer to, for example, documents 6 and 7), and in a liquid for electrophoretic display which is well-known prior to the present application as described in cited documents 1 to 3, it could be easily made by persons skilled in the art to adopt the above-well-known surfactants and to subject particles surface treatment for making lipophilic.

Claims 2, 3, 8

As described in cited documents 1 to 3, it is a well-known art prior to the present application to use dispersants by suitably mixing two or more dispersants such as a surfactant and a block type polymer, and also it is described in cited document 4 to use acetyleneglycol to stabilize dispersion of particles in a liquid for electrophoretic display considering dispersibility and electric charge of particles.

And further it is well-known that blockpolymers of a surfactant include polyoxyethylene oxypropylene blockpolymer and that acetyleneglycol base surfactants include acetyleneglycol derivatives, acetylenediol and acetylenealcohol (refer to, for example, cited documents 8 to 12).

Thus, it could be easily made by persons skilled in the art to make a constitution of using the above-well-known alkylpolyetheramine base surfactants and the above-well-known polyethylene oxypropylene blockpolymer as surfactants and blockpolymer type polymer and using acetyleneglycol

derivatives, acetylenediol and acetylene alcohol as the above-well-known acetylene base surfactants in a liquid for electrophoretic display well-known prior to the present application as described in cited documents 1 to 3.

Further, it is merely a well-known art in a liquid for electrophoretic display to subject fine particles to surface treatment for making lipophilic with a coupling agent of titanate base, aluminium base or silicone base.

Claims 4-6

In a liquid for electrophoretic display well-known prior to the present application as described in cited documents 1 to 3, it could be suitably made by persons skilled in the art to control the average molecular weight to 1000 to 4000 upon adopting the above polyoxyethylene propylene(POEOP) and to control the amount of ethyleneoxide in blockpolymer to 50 wt % or less and also to control the content of the blockpolymer to 0.01 to 30 wt % based on the total amount of the liquid for display.

claim 7

In a liquid for electrophoretic display well-known prior to the present application as described in cited documents 1 to 3, it could be suitably made by persons skilled in the art to limit HLB of acetylene derivatives to 10 or less upon adopting the acetylene derivatives such as acetyleneglycol derivatives, acetylenediol and acetylene alcohol as the above well-known acetyleneglycol base surfactant.

Claim 9 to 11

Considering dispersibility and electric charge of fine

particles in a liquid for electrophoretic display, it is merely a well-known art prior to the present application to subject fine particles to surface treatment for making lipophilic with a coupling agent of titanate base, aluminium base or silane base.

Claim 12

In a liquid for electrophoretic display well-known prior to the present application as described in cited documents 1 to 3, it is suitably made by persons skilled in the art to control the content of alkylpolyetheramine to 1.0 to 200 wt % based on that of fine particles upon adopting an alkylpolyetheramine as a surfactant.

Claims 13 to 18

In a liquid for electrophoretic display well-known prior to the present application as described in documents 1 to 3, each of the constitutions listed below is described in cited documents 1 to 12 or is suitably made by persons skilled in the art based on descriptions in those documents;

- at least one kind of fine particle is a polymer fine particle containing a colorant, an organic pigment or inorganic pigment
- the polymer fine particle containing a colorant comprises a cross-linked acryl base resin,
- the mean particle size of the fine particles is 0.05 to 20  $\mu\text{m}$ ,
- the liquid further contains a dispersant,
- the dispersant is a nonion base or anion base surfactant,
- the content of the dispersant is 0.01 to 50 wt% based on the total amount of the liquid for display.

Claims 19 to 24



In an electrophoretic display medium, it is a merely well-known art prior to the present application to encapsulate a liquid for electrophoretic display into each independent structure of microcapsules or cells (refer to, for example, cited documents 2 to 4), and the constitutions listed below are suitably made by persons skilled in the art;

- the size of the microcapsules is 10 to 200  $\mu\text{m}$ ,
- the microcapsules have flexibility and less produce a gap in arranging them,
- the volume of independent cells is  $1 \times 10^{-9}$  cc to  $1 \times 10^{-3}$  cc,
- an electrophoretic display device has a structure in which the electrophoretic display medium is interposed between a pair of substrates on which a light-transmitting electrode is formed.

Further, in the structure of the cells filled with liquid for electrophoretic display as described in cited documents 2 to 4, it is suitably made by persons skilled in the art to subject the electrode part and the cell part with which the liquid for electrophoretic display is brought into contact to hydrophilization treatment considering affinity with the fine particles, and the hydrophilization treatment such as ozone treatment, plasma treatment, corona treatment, UV treatment, sputtering treatment, polymer layer-forming treatment inorganic layer-forming treatment and organic or inorganic hybrid layer-forming treatment is well-known prior to the present application.

List of cited documents

D1. Japanese Patent Application Laid-open No. 266818/1991

(page 2, lower right col. line 19 to page3, lower left col. line 20)

D2. Japanese Patent Application Laid-open No. 149691/2003  
([0026]-[0029])

D3. Japanese Patent Application Laid-open No. 056653/2001  
([0055])

D4. WO2003/013148 or Published Japanese translation of PCT  
international publication for patent application No.  
537765/2004([0075], [0078])

D5. Japanese Patent Application Laid-open No. 173193/1993  
([0023])

D6. Japanese Patent Application Laid-open No. 216256/2005  
([0028], [0031])

D7. Japanese Patent Application Laid-open No. 107332/1976  
(page 2, upper left col. ~ upper right col.)

D8. Japanese Patent Application Laid-open No. 342411/2001  
([0009])

D9. Japanese Patent Application Laid-open No. 283715/2002  
([0033])

D10. Japanese Patent Application Laid-open No. 192956/2003  
([0077] - [0080])

D11. Japanese Patent Application Laid-open No. 147241/2003  
([0090], [0092])

D12. Japanese Patent Application Laid-open No. 183582/2003  
([0043] - [0049])

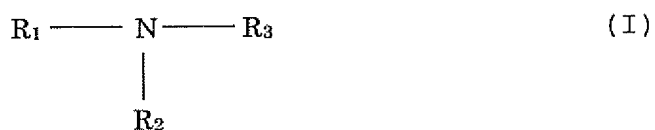
#### Reason 2

Reason 2 is clarity-nature objections, so they are omitted.

[Name of Document]	Amendment
[Submission Date]	May 15, 2006
[Address]	Commissioner of Patent Office
[Identification of the Case]	
[Application Number]	Patent Application No. 2005-513637
[Applicant of Patent]	
[Identification Number]	0005957
[Name]	Mitsubishi Pencil Co., Ltd.
[Agent]	
[Identification Number]	100112335
[Patent Attorney]	
[Name]	Eisuke Fujimoto
[Amendment 1]	
[Document to be amended]	Claims
[Item to be amended]	Whole Claims
[Method of Amendment]	Change
[Subject Matter of amendment]	As per attached sheets

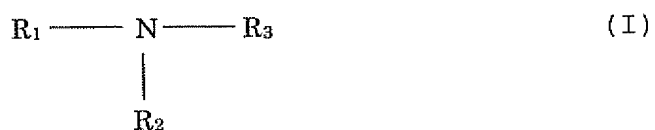
(Amended Claims Filed on May 15, 2006)

1. A liquid for electrophoretic display comprising at least alkylpolyetheramine having a structural unit represented by the following Formula (I), one or more kinds of fine particles, a dispersant and a dispersion liquid medium, wherein the fine particles described above contain fine particles subjected to surface treatment for making lipophilic and a content of alkylpolyetheramine is 1.0 to 200% by weight based on a content of fine particles:



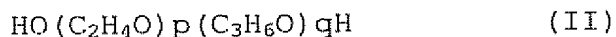
in Formula (I) described above,  $R_1$  is a saturated hydrocarbon group or an unsaturated hydrocarbon group;  $R_2$  is  $(CH_2CH_2O)_x-H$ ;  $R_3$  is  $(CH_2CH_2O)_y-H$ ; and  $x$  is 0 or a positive number and  $y$  is a positive number.

2. A liquid for electrophoretic display comprising at least alkylpolyetheramine having a structural unit represented by the following Formula (I), a polyoxyethylene oxypropylene block polymer having a structural unit represented by the following Formula (II), one or more kinds of fine particles and a dispersion liquid medium, wherein a content of the alkylpolyetheramine is 1.0 to 200% by weight based on a content of fine particles:



in Formula (I) described above,  $R_1$  is a saturated hydrocarbon group or an unsaturated hydrocarbon group;  $R_2$  is  $(CH_2CH_2O)_x-H$ ;  $R_3$  is  $(CH_2CH_2O)_y-H$ ; and  $x$  is 0 or a positive number and  $y$  is a positive

number;



in Formula (II) described above, p and q are positive numbers.

3. The liquid for electrophoretic display as described in claim 2, wherein the polyoxyethylene oxypropylene block polymer has an average molecular weight of 1000 to 4000.

4. The liquid for electrophoretic display as described in claim 2 or 3, wherein an amount of ethylene oxide in the polyoxyethylene oxypropylene block polymer is 50% by weight or less.

5. The liquid for electrophoretic display as described in any one of claims 2 to 4, wherein a content of the polyoxyethylene oxypropylene block polymer is 0.01 to 30% by weight based on the total amount of the display liquid.

6. The liquid for electrophoretic display as described in any one of claims 2 to 5, wherein the fine particles are subjected to surface treatment for making the fine particles lipophilic.

7. The liquid for electrophoretic display as described in claim 1 or 6, wherein the surface treatment for making the fine particles lipophilic is carried out with a coupling agent.

8. The liquid for electrophoretic display as described in claim 7, wherein the coupling agent is at least one selected from the group consisting of titanate base coupling agents, aluminum base

coupling agents and silane base coupling agents.

9. The liquid for electrophoretic display as described in claim 1 or any one of claims 6 to 8, wherein a surface functional group of the fine particles subjected to the surface treatment for making the fine particles lipophilic is an alkoxycarbonyl group.

10. The liquid for electrophoretic display as described in any one of claims 1 to 9, wherein at least one kind of the fine particles is polymer fine particles containing a colorant, an organic pigment or an inorganic pigment.

11. The liquid for electrophoretic display as described in claim 10, wherein a structural component of the polymer fine particles containing a colorant is a cross-linked acryl base resin.

12. The liquid for electrophoretic display as described in any one of claims 1 to 11, wherein the fine particles have a mean particle size of 0.05 to 20  $\mu\text{m}$ .

13. The liquid for electrophoretic display as described in any one of claims 2 to 12, further comprising a dispersant.

14. The liquid for electrophoretic display as described in claim 1 or 13, wherein the dispersant is a nonionic or anionic surfactant.

15. The liquid for electrophoretic display as described in claim 1, 13 or 14, wherein a content of the dispersant is 0.01 to 50%

by weight based on the total amount of the display liquid.

16. A medium for electrophoretic display wherein the liquid for electrophoretic display as described in any one of claims 1 to 15 is filled into each independent structure of microcapsules or cells.

17. The medium for electrophoretic display as described in claim 16, wherein in the structure of the cell filled with the liquid for electrophoretic display, an electrode part and a cell part that the liquid for electrophoretic display touches are subjected to hydrophilization treatment selected from the group consisting of ozone treatment, plasma treatment, corona treatment, UV itoro treatment, sputtering treatment, polymer layer-forming treatment, inorganic layer-forming treatment and organic or inorganic hybrid layer-forming treatment.

18. The medium for electrophoretic display as described in claim 16, wherein the microcapsule has a size of 10 to 200  $\mu\text{m}$ .

19. The medium for electrophoretic display as described in claim 16 or 18, wherein the microcapsule has flexibility and is less liable to generate a space in arranging the microcapsules.

20. The medium for electrophoretic display as described in any one of claims 16 to 19, wherein the independent cells have a volume of  $1 \times 10^{-9}$  to  $1 \times 10^{-3}$  ml.

21. An electrophoretic display device comprising a pair of

substrates in which a light-transmitting electrode is formed on at least one substrate and the medium for electrophoretic display as described in any one of claims 16 to 19 interposed between the above substrates.



Dispatch No. 570347  
January 16, 2007

Decision of Refusal

Patent Application No.: Patent Application No. 2005-513637  
Drafting date: December 11, 2006  
Examiner of JPO: Tadashi KAWAHARA 9017 2X00  
Title of the Invention: Liquid of Electrophoretic Display,  
Display Medium and Display Device Using  
the Same  
Applicant: Mitsubishi Pencil Co., Ltd.  
Representative: Masayoshi KANDA

This patent application is refused for the reason 1 as stated in the notification of reasons for refusal dated March 10, 2006.

The argument and amendment have been examined, but no basis sufficient to overthrow the previously given reasons for refusal has been found.

Remark

Reason 1

• Claim 1

As described in the cited documents 1 to 3 and Japanese Patent Application Laid-open No. 2002-350904 ([0013] etc.), it is a well-known technical matter prior to the present application to control a surface electro charge of the electrophoretic fine particles and dispersibility thereof by a surfactant and a dispersant in a liquid for electrophoretic display and an electrophoretic display device.

And it is described in the cited documents 1 to 3 to use an alkylpolyetheramine such as polyoxyethylene lauryl amine and polyoxyethylene stearyl amine as a surfactant and a dispersant and to use them in combination of two or more kinds.

Further, as described in cited documents 2 to 5, it is merely a well-known art prior to the present application to subject fine

particles to surface treatment for making lipophilic with a coupling agent of titanate base, aluminium base or silane base in a liquid for electrophoretic display considering dispersibility and electro charge of electrophoretic fine particles.

And in the liquid for electrophoretic display as described in cited documents 1, 2 and 3, it could be easily made by persons skilled in the art to assume a constitution comprising polyoxyethylene stearyl amine or polyoxyethylene lauryl amine, fine particles, a dispersant and a dispersion liquid medium wherein the fine particles are subjected to surface treatment for making lipophilic based on the above-mentioned well-known art prior to the present invention.

And it is a merely ordinary technical matter for persons skilled in the art to consider a life and mobility depending on coagulation which are affected by dispersibility and surface electro charge in controlling surface electro charge of the electrophoretic fine particles and dispersibility thereof by using the dispersant and the surfactant such as polyoxyethylene lauryl amine and polyoxyethylene stearyl amine and further to determine an optimal and suitable content considering a fact that desired dispersibility and surface electro charge are not obtained if the dispersant and the surfactant are used too little relative to the electrophoretic fine particles and electrical characteristics such as insulating property which requires of a solvent, and thus it could be suitably made by persons skilled in the art to employ the content of alkylpolyetheramine relation to the fine particles as described in claim 1.

Further, excellent visual evaluation of a white display face and a colored display face, presence of coagulation and adhesion of the fine particles, response, contact and a life, which are the effects of the present application the applicant insists, are only realized by constitutions of Examples.

They are not always perceived technically and objectively to be the effects exerted over the whole range of the content of

alkylpolyetheramine described in claim 1 by the constitution which is not necessarily prescribed in detail with respect to the fine particles, the dispersant, the dispersion liquid medium, the treatment for making lipophilic and the alkylpolyetheramine, which are described in claim 1.

Further, comparison between those containing the material defined as (I) in claim 1 and those containing other materials is carried out only with alkylpolyetheramine E-5 (polyoxyethylene alkylamine propylenediamine) and alkylamine E-6 (trioctylamine), but not carried out with others containing the surfactant and the dispersant which control the surface electro charge and the dispersibility. Therefore, it is impossible to evaluate and grasp technically and objectively a difference of the effects.

In addition, it is obvious to persons skilled in the art that characteristics of the display device such as contract, response, a coagulation property and a life change by effects such as the size, the kind (materials), the color, the amount and the treatment specification of the fine particles, the dispersant and surfactant, the dispersion liquid medium and the treatment for making lipophilic respectively, and it is a matter of course to select those having a preferable characteristic.

Thus, the effects which the applicant insists are not specifically significant or are not based on descriptions in claims and can not be accepted.

• Claims 7 to 21

Inventions depending on amended claim 1 among inventions claimed in amended claims 7 to 21 are made easily by persons skilled in the art on the basis of the above-mentioned reason for amended claim 1 and the reasons described for claims 9 to 11 and 13 to 21 prior to the amendment which correspond to those in the previous notification of reasons for refusal.

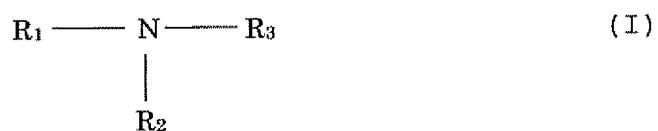
Thus, the inventions claimed in amended claims 1 and 7 to 21 could be made easily by persons skilled in the art on the basis

of arts described in cited documents 1 to 12 and well-known arts and technical matters prior to the present application and therefore should not be granted a patent under Patent Law Section 29(2).

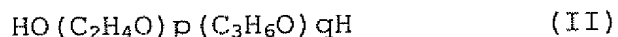
[Name of Document]	Amendment
[Submission Date]	March 12, 2007
[Address]	Commissioner of Patent Office
[Identification of the Case]	
[Appeal Number]	2007-4756
[Application Number]	Patent Application No. 2005-513637
[Applicant of Patent]	
[Identification Number]	0005957
[Name]	Mitsubishi Pencil Co., Ltd.
[Agent]	
[Identification Number]	100112335
[Patent Attorney]	
[Name]	Eisuke Fujimoto
[Dispatch Number]	570347
[Amendment 1]	
[Document to be amended]	Claims
[Item to be amended]	Whole Claims
[Method of Amendment]	Change
[Subject Matter of amendment]	As per attached sheets

(Amended Claims Filed on March 12, 2007)

1. A liquid for electrophoretic display comprising at least alkylpolyetheramine having a structural unit represented by the following Formula (I), a polyoxyethylene oxypropylene block polymer having a structural unit represented by the following Formula (II), one or more kinds of fine particles and a dispersion liquid medium, wherein a content of the alkylpolyetheramine is 1.0 to 200% by weight based on a content of fine particles:



in Formula (I) described above,  $R_1$  is a saturated hydrocarbon group or an unsaturated hydrocarbon group;  $R_2$  is  $(CH_2CH_2O)_x-H$ ;  $R_3$  is  $(CH_2CH_2O)_y-H$ ; and  $x$  is 0 or a positive number and  $y$  is a positive number;



in Formula (II) described above,  $p$  and  $q$  are positive numbers.

2. The liquid for electrophoretic display as described in claim 1, wherein the polyoxyethylene oxypropylene block polymer has an average molecular weight of 1000 to 4000.

3. The liquid for electrophoretic display as described in claim 1 or 2, wherein an amount of ethylene oxide in the polyoxyethylene oxypropylene block polymer is 50% by weight or less.

4. The liquid for electrophoretic display as described in any one of claims 1 to 3, wherein a content of the polyoxyethylene

oxypropylene block polymer is 0.01 to 30% by weight based on the total amount of the display liquid.

5. The liquid for electrophoretic display as described in any one of claims 1 to 4, wherein the fine particles are subjected to surface treatment for making the fine particles lipophilic.

6. The liquid for electrophoretic display as described in claim 5, wherein the surface treatment for making the fine particles lipophilic is carried out with a coupling agent.

7. The liquid for electrophoretic display as described in claim 6, wherein the coupling agent is at least one selected from the group consisting of titanate base coupling agents, aluminum base coupling agents and silane base coupling agents.

8. The liquid for electrophoretic display as described in any one of claims 5 to 7, wherein a surface functional group of the fine particles subjected to the surface treatment for making the fine particles lipophilic is an alkoxycarbonyl group.

9. The liquid for electrophoretic display as described in any one of claims 1 to 8, wherein at least one kind of the fine particles is polymer fine particles containing a colorant, an organic pigment or an inorganic pigment.

10. The liquid for electrophoretic display as described in claim 9, wherein a structural component of the polymer fine particles

containing a colorant is a cross-linked acryl base resin.

11. The liquid for electrophoretic display as described in any one of claims 1 to 10, wherein the fine particles have a mean particle size of 0.05 to 20  $\mu$ m.

12. The liquid for electrophoretic display as described in any one of claims 1 to 11, further comprising a dispersant.

13. The liquid for electrophoretic display as described in claim 12, wherein the dispersant is a nonionic or anionic surfactant.

14. The liquid for electrophoretic display as described in claim 12 or 13, wherein a content of the dispersant is 0.01 to 50% by weight based on the total amount of the display liquid.

15. A medium for electrophoretic display wherein the liquid for electrophoretic display as described in any one of claims 1 to 14 is filled into each independent structure of microcapsules or cells.

16. The medium for electrophoretic display as described in claim 15, wherein in the structure of the cell filled with the liquid for electrophoretic display, an electrode part and a cell part that the liquid for electrophoretic display touches are subjected to hydrophilization treatment selected from the group consisting of ozone treatment, plasma treatment, corona treatment, UV itoro treatment, sputtering treatment, polymer layer-forming treatment, inorganic layer-forming treatment and organic or inorganic hybrid



layer-forming treatment.

17. The medium for electrophoretic display as described in claim 15, wherein the microcapsule has a size of 10 to 200  $\mu\text{m}$ .

18. The medium for electrophoretic display as described in claim 15 or 17, wherein the microcapsule has flexibility and is less liable to generate a space in arranging the microcapsules.

19. The medium for electrophoretic display as described in any one of claims 15 to 18, wherein the independent cells have a volume of  $1 \times 10^{-9}$  to  $1 \times 10^{-3}$  ml.

20. An electrophoretic display device comprising a pair of substrates in which a light-transmitting electrode is formed on at least one substrate and the medium for electrophoretic display as described in any one of claims 15 to 19 interposed between the above substrates.

Dispatch No. 247546  
May 29, 2007

Decision to Grant a Patent

Patent Application No.: Patent Application No. 2005-513637  
Drafting date: May 21, 2007  
Examiner of JPO: Tadashi KAWAHARA 9017 2X00  
Title of the Invention: Liquid of Electrophoretic Display,  
Display Medium and Display Device Using  
the Same  
Applicant: Mitsubishi Pencil Co., Ltd.  
Representative: Eisuke FUJIMOTO (two others)

[Reconsideration by Examiner before Appeal]  
The original decision is withdrawn.  
This patent application is to be granted a patent, since no reason  
for refusal has been found.